

REMARKS

I. STATUS OF THE CLAIMS

Claims 1-23 and 25-35 are currently pending. Of these, claims 11-19, 25 and 35 are allowed, and claim 10 is "objected to".

II. REJECTION OF CLAIMS 1-4, 20, 22-24 AND 26-29 UNDER 35 USC 103 AS BEING UNPATENTABLE OVER KAWAKAMI IN VIEW OF GRUBB

Claim 1 recites an optical communication system comprising (a) a transmitting station; (b) an optical transmission line for transmitting a wavelength division multiplexed (WDM) optical signal sent from said transmitting station; (c) a receiving station for receiving said optical signal outputted from said optical transmission line; (d) a repeater station provided in said optical transmission line between said transmitting station and said receiving station; (e) a first pump light source, located in one of said transmitting station, said receiving station, and said repeater station, supplying pump light at a first wavelength to said optical transmission line; and (f) a second pump light source, located in a different one of said transmitting station, said receiving station and said repeater station, supplying pump light at second wavelength, different from the first wavelength, to said optical transmission line.

As recited, for example, in claim 1, the pump light at the first wavelength and the pump light at the second wavelength cause Raman amplification of said optical signal to occur in different spans of said optical transmission line, and thereby cause the optical signal to be amplified by a combined Raman amplification as the optical signal travels through the different spans. Further, as recited, for example, in claim 1, the first and second wavelengths are selected to reduce gain tilt of the combined Raman amplification and thereby provide a substantially flat gain over wavelengths of the optical signal.

In addition, as recited, for example, in claim 1, the optical communication system comprises a controller centrally controlling settings of the first and second wavelengths through communication lines to the first and second pump light sources, to reduce the gain tilt, wherein the controller controls the setting of the first and second wavelengths in a repeating, sequential order.

In the Office Action, the Examiner concedes that Kawakami does not specifically disclose a first pump light source and a second pump light source supplying two different wavelengths and providing a substantially flat gain over wavelengths of the optical signal, and a controller centrally setting the first and second wavelengths through communication lines to the first and second pump light sources, to reduce gain tilt.

Grubb discloses a plurality of devices 12 positioned along a transmission line. See, for

example, devices 12 in FIG. 2 of Grubb. Each device 12 supplies Raman pump light to the transmission line.

However, in Grubb, devices 12 are positioned along the transmission line between transmitters and receivers. See, for example, FIG. 2, of Grubb. Grubb does not disclose or suggest that a first pump light source is located in one of a transmitting station, a receiving station, and a repeater station, and a second pump light source is located in a different one of the transmitting station, the receiving station and the repeater station, as recited, for example, in claim 1. Therefore, it is respectfully submitted that the overall structure of the system in Grubb is significantly different than that recited, for example, in claim 1.

Column 8, line 67, through column 9, line 10 (cited by the Examiner) of Grubb, indicate that gain profile variations can be performed between the stages.

However, Grubb does not provide any details as to how the gain profile variations can be performed. More specifically, Grubb does not disclose or suggest that a controller centrally controls the setting of the first and second wavelengths in a repeating, sequential order as recited, for example, in claim 1.

Therefore, it is respectfully submitted that neither reference, taken individually or in combination, discloses or suggest the present invention as recited, for example, in claim 1.

Although the above arguments are specifically directed to claim 1, it is respectfully submitted that the arguments would be helpful in understanding various differences of various rejected claims over the cited references.

* * *

Claim 4 recites a shielding part provided in a station opposing said one or said different one of said transmitting station, said receiving station and said repeater station. As recited in claim 4, the shielding part shields said opposing station from residual pump light provided by said one or said different one of said transmitting station, said receiving station and said repeater station.

On page 5 of the Office Action, the Examiner asserts that "shielding the pump light is well known in the art, one of ordinary skill in the art would have been motivated to do this in order to prevent the signal light leakage and provide a stronger signal light. Further, whether or not to shield the pump light is merely an engineering design choice."

It is respectfully submitted claim 4 relates to a shielding part having a specific positioning and a specific operation. The Examiner has not provided a reference that discloses or suggests such specific positioning and specific operation. If the Examiner continues to maintain the rejection of claim 4, it is respectfully requested that the Examiner provide a specific reference that discloses the specific positioning and operation of a shielding part as recited, for example, in claim 4.

As indicated above, Grubb does not disclose or suggest that a first pump light source is located in one of a transmitting station, a receiving station, and a repeater station, and a second pump light source is located in a different one of the transmitting station, the receiving station and the repeater station. Moreover, Grubb does not disclose or suggest any shielding mechanism. Therefore, it is respectfully submitted that Grubb does not disclose or suggest a shielding part as recited, for example, in claim 4.

Moreover, none of the references relate to providing shielding in a station that opposes a respective station providing pump light, or indicate why such shielding should be provided.

In view of the above, it is respectfully submitted that claim 4 is patentable over the cited references.

* * *

Claim 20 relates to a method for supplying pump light used for Raman amplification in an optical transmission line, comprising (a) a first step of supplying pump light having a first optical power to said optical transmission line; (b) a second step of detecting optical power of light Raman-amplified by said pump light having said first optical power; (c) a third step of supplying pump light having a second optical power larger than said first optical power, to said optical transmission line; (d) a fourth step of detecting optical power of light Raman-amplified by said pump light having said second optical power; and (e) a fifth step of giving a warning about anomaly occurring at a supplying destination of said pump light when a comparison result between detection results of the second step and the fourth step is within a predetermined range.

The Examiner asserts that such operation is shown in column 6, lines 57-66; column 4, lines 10-17; and column 8, line 67, through column 9, line 10, of Grubb.

Column 6, lines 57-66, and column 4, lines 10-17, of Grub indicate that the pump light energy can be dynamically varied to produce a controlled signal intensity variation profile over the signal wavelength range. Moreover, column 8, line 67, through column 9, line 10, of Grubb, indicates that a local controller 34 can transmit/ receive supervisory and or monitoring information.

However, it is respectfully submitted that these portions of Grubb do not disclose or suggest supplying and detecting different pump lights at different optical powers, and giving a warning when a comparison result between detection results is within a predetermined range.

For example, the cited portions of Grubb do not disclose or suggest any type of comparison of lights that have been amplified by Raman pump lights with different optical powers.

Please note that claim 20 recites a specific manner of supplying pump light, detecting Raman amplified light, and the giving of a warning when a specific situation occurs. More

specifically, claim 20 recites supplying pump light having a first optical power; detecting optical power of light Raman-amplified by said pump light having said first optical power, supplying pump light having a second optical power larger than said first optical power, to said optical transmission line; and detecting optical power of light Raman-amplified by said pump light having said second optical power. Grubb does not disclose or suggest this operation.

Further, claim 20 specifically recites giving a warning about anomaly occurring at a supplying destination of said pump light when a comparison result is within a predetermined range. It is respectfully submitted that the general disclosure cited by the Examiner in Grubb, relating to the use of supervisory and monitoring information, does not disclose or suggest such a warning. For example, the cited portions of Grubb do not mention any type of warning, and do not mention any warning relating to an anomaly occurring at a supplying destination of pump light for Raman amplification.

* * *

Claim 22 recites (a) supplying a first pump light at a predetermined value to an optical transmission line, the first pump light exciting an optical signal having a first wavelength band; (b) detecting optical power of the optical signal having the first wavelength band; (c) detecting optical power of an optical signal having a second wavelength band different from the first wavelength band; and (d) adjusting a second pump light so that both detection results fall within a predetermined fixed range, wherein the second pump light excites the optical signal having the second wavelength band.

The Office Action does not address the specific recitation of adjusting the second pump light so that both detection results fall within a predetermined fixed range as recited, for example, in claim 22. Therefore, if the Examiner continues to maintain the rejection, it is respectfully requested that the Examiner identify specific portions of the cited references that disclose or suggest such features.

Column 8, line 67, through column 9, line 10 of Grubb, indicate that gain profile variations can be preformed between the stages. However, Grubb does not provide any details as to how the gain profile variations can be performed. More specifically, Grubb does not disclose or suggest adjusting the second pump light so that both detection results fall within a predetermined fixed range as recited, for example, in claim 22.

Therefore, it is respectfully submitted that neither Kawakami nor Grubb discloses or suggests adjusting a second pump light so that detection results fall within a predetermined fixed range, as recited, for example, in claim 22.

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In view of the above, it is respectfully submitted that the rejection is overcome.

III. REJECTION OF CLAIM 21 UNDER 35 USC 103 AS BEING
UNPATENTABLE OVER KAWAKAMI IN VIEW OF GRUBB AND FURTHER
IN VIEW OF WU

The present invention as recited, for example, in independent claim 20 (from which rejected claim 21 depends), relates to (a) supplying pump light having a first optical power to an optical transmission line; (b) detecting optical power of light Raman-amplified by the pump light having said first optical power; (c) supplying pump light having a second optical power larger than said first optical power, to the optical transmission line; (d) detecting optical power of light Raman-amplified by the pump light having the second optical power; and (e) giving a warning about anomaly occurring at a supplying destination of the pump light when a comparison result between detection results is within a predetermined range.

The above comments for distinguishing independent claim 20 over Kawakami and Grubb also apply here, where appropriate.

Wu discloses that pump light is shut off in response to a change in a supervisory signal transmitted from a supervisory source, to shut off the pump light in the event of a fiber cut. See, for example, FIG. 1, and the disclosure in column 4, line 28, through column 5, line 36, of Wu.

None of the references disclose or suggest that pump light for Raman amplification are supplied at different optical powers, and that a warning is given when a comparison result of detected powers of Raman-amplified light is within a predetermined range.

In view of the above, it is respectfully submitted that the rejection is overcome.

IV. REJECTION OF CLAIMS 5-9 AND 3-34 UNDER 35 USC 103 AS BEING
UNPATENTABLE OVER KAWAKAMI IN VIEW OF GRUBB AND FURTHER
IN VIEW OF KOSAKA

The above comments for distinguishing over the various references also apply here, where appropriate.

V. CONCLUSION

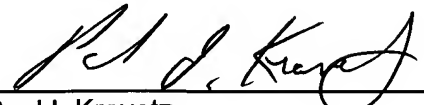
In view of the above, it is respectfully submitted that the application is in condition for allowance and a Notice of Allowance is earnestly solicited.

If any further fees are required in connection with the filing of this response, please charge such fees to our Deposit Account No. 19-3935.

Respectfully submitted,

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